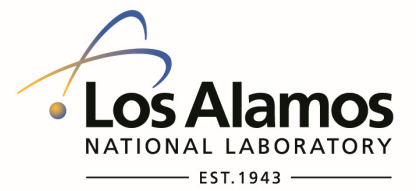
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DP Site Aggregate Area Building 21-257 Footprint Letter Work Plan



Prepared by the Environmental Programs Directorate

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EP2014-0427

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October 2014

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EXECUTIVE SUMMARY

This letter work plan addresses the building 21-257 footprint [Solid Waste Management Unit (SWMU) 21-011(a)] and associated Areas of Concern (AOCs) 21-001, C-21-005, and C-21-007 within Material Disposal Area T at Technical Area 21. Building 21-257 was used for waste treatment starting in the 1960s. This building is connected to various SWMUs, AOCs, and consolidated units that are part of the Delta Prime Site Aggregate Area at Los Alamos National Laboratory (the Laboratory). The requirement to submit this work plan after removal of building 21-257 was originally proposed in the "Investigation Work Plan for Delta Prime Site Aggregate Area Delayed Sites," prepared by the Laboratory in 2009 and approved by the New Mexico Environment Department in 2010. Building 21-257 is currently being prepared for demolition activities planned for fiscal year 2020.

This letter work plan proposes investigation sampling and any necessary soil removal after the concrete slab (the footprint), subsurface structures, and floor drain/outfall lines are removed. Sampling and excavations will be coordinated with demolition activities. Field screening results and analytical results will be used to determine if additional sampling or soil removal is required before demobilization. The three adjoining AOCs associated with the building activities will also be addressed as part of this investigation.

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1.0 INTRODUCTION

The Los Alamos National Laboratory (LANL or the Laboratory) Technical Area 21 (TA-21) Campaign is investigating Delta Prime (DP) Site Aggregate Area sites potentially contaminated by past Laboratory operations. In accordance with the approved "Investigation Work Plan for DP Site Aggregate Area Delayed Sites" (LANL 2009, 108166.9; NMED 2010, 108443), the Laboratory is submitting this letter work plan outlining the proposed investigation sampling of the building 21-257 footprint area following the removal of remaining surface (i.e., concrete slab) and subsurface structures (i.e., floor drainlines and tanks). Also included in this plan is the investigation of three areas of concern (AOCs) associated with the building 21-257 operations.

Building 21-257 is located on DP Mesa within Material Disposal Area (MDA) T at TA-21 and is designated as Solid Waste Management Unit (SWMU) 21-011(a) (Figure 1.0-1). The AOCs include 21-001, a containerized radioactive sludge storage area located at the southwest corner of building 21-257; C-21-005, a release of americium-241 and plutonium from leaking piping on the west side of the building; and C-21-007, a surface release of plutonium, americium, and uranium from a tank vent. AOC C-21-033, a 1976 transuranic (TRU) cement paste spill, was associated with building 21-257 activities, but the spill occurred nearer the MDA T shaft/absorption field (the exact location is not known). Therefore, this AOC is not addressed in this letter work plan as prescribed in the Delayed Sites work plan but was included as part of the investigation of the MDA T shaft/absorption field (LANL 2006, 094151).

2.0 BACKGROUND AND SCOPE OF ACTIVITIES

The operational history, previous investigations, and field activities for building 21-257 are presented below. The work will be conducted in accordance with the field methods outlined in the approved Delayed Sites investigation work plan (LANL 2009, 108166.9, section 8.0; NMED 2010, 108443).

Figure 2.0-1 shows the different rooms/areas within the building, the approximate AOC and SWMU boundaries, and the site utilities. Background information for the three AOCs included in this work plan is limited. The available information on AOCs 21-001, C-21-005, and C-21-007 will used during the investigation of SWMU 21-011(a), as prescribed in the approved Delayed Sites work plan (LANL 2009, 108166.9; NMED 2010, 108443).

Installation of a vapor-monitoring well near or beneath the building 21-257 footprint was prescribed by the New Mexico Environment Department (NMED) in the MDA T Phase III investigation report Notice of Disapproval and was agreed to by the Laboratory (LANL 2009, 108010). However, in a 2011 letter (NMED 2011, 207573), NMED stated that vapor monitoring is no longer necessary at the site because adequate vapor data are available to complete the corrective measures evaluation for MDA T. In addition, investigation/remediation activities in the area have been delayed. The need/location for a new vapor well cannot be determined until demolition of 21-257 and implementation of this investigation is complete. Therefore, a new vapor-monitoring well will not be installed as part of this work plan.

2.1 Operational History of Building 21-257

Building 21-257 was the TA-21 radiological liquid waste treatment facility designed to treat liquid waste from DP Site operations (DP East and DP West buildings) and prepare the waste for disposal. Building 21-257 replaced the original treatment/disposal building 21-35 to handle larger quantities of waste (Francis 1994, 076114) and was constructed between July 1966 and August 1967 (McGehee and Garcia 1999, 087442). The plant became operational in late 1967 (Emelity and Christenson 1971, 082623), after the original treatment plant building 21-35 was removed (LASL 1962, 089732).

In the mid- to late 1960s, after building 21-035 was removed, all the waste lines were extended to the new waste treatment plant building 21-257 (LASL 1968, 089723; LASL 1975, 089724).

The building 21-257 treatment plant connects to, and is located east of, the MDA T shaft field and retrievable waste storage area. Solid-type waste and some liquid waste remaining after treatment were disposed of at MDA T, with the treated liquid waste released through an outfall [SWMU 21-011(k)], which discharged to DP Canyon. Some treated wastes were taken to Area G for final disposal. This practice continued until the mid-1980s when the treatment plant was connected to the radiological liquid waste treatment facility at TA-50 (Emelity 1987, 001777; Francis 2000, 069900).

Figure 2.1-1 shows the process areas throughout building 21-257. This figure is based on as-built engineering drawings from 1968 (LASL 1968, 081175.25; LASL 1968, 081175.32). The facility configuration, waste streams and processes, and descriptions of the AOCs are presented below.

2.1.1 Facility Configuration

Building 21-257 is an approximately 4000–ft^2 building with a rectangular foundation footprint consisting of reinforced concrete slab, stem walls, and footings (McGehee and Garcia 1999, 087442). The rooms and process areas of building 21-257, including process equipment (to the extent known) and the floor drains located in several of the rooms, are described below. As discussed below, the drainlines beneath the floors could have been sources of potential soil contamination beneath the building 21-257 footprint. An overview of the waste streams and treatment processes is presented in section 2.1.2.

Many minor changes to the building were made through the years. In 1969, the jib crane located on the south end of building 21-257 was removed so the west and south walls of the south elevation could be extended outward, making them flush with the east end of the building. Minor window and door modifications were made in 1977. The containment reservoirs and tanks were replaced in 1978. A vacuum filter was installed in 1981 (LANL 2010, 162309). Contaminated pipe, scaffolding, associated tanks, the pug mill, and the walls of the room containing the pug mill were removed in 1986 (Elder et al. 1986, 006666).

Building 21-257 was still active as of September 2006 and was inactive in standby status while the buildings that fed influent to this treatment plant were being decontaminated and readied for demolition in 2009 (LANL 2006, 094151; LANL 2009, 108166.9; LANL 2009, 108166.4; LANL 2010, 162309).

The building is currently being prepared for demolition. The northwest corner of the building (batch waste storage area west of Area 105) and a portion of Area 103 are currently managed as radiological controlled areas with limited access because of the high levels of radioactive contamination present.

Rooms and Areas, Including Interior Tanks

At the south end of building 21-257 is the building entryway, Room 101, which opens into Room 110, the stockroom (Figure 2.1-1).

Area 102 housed the pug mill system (Figure 2.1-1). A floor drain is located near the center of this room.

Area 103 was the americium drum tumbler area (Figure 2.1-1). A floor drain is located near the center of this room.

Area 104 was the batch waste process area where two of the influent batch waste storage tanks and the chemical feeders to the batch waste treatment process area (Area 106) were located (Figure 2.1-1). Four floor drains are located in this area.

Area 105 was the process area (Figure 2.1-1). Clockwise, this area includes the following: flash mixer, flocculator, sludge collector, settling tank, filter sump, pressure filter, sludge storage, and another influent batch waste storage tank (LASL 1968, 081175.53; LASL 1968, 081175.28; LASL 1968, 081175.29). In this area, the waste treatment areas are located below floor grade in a basement, except for the pressure filter system, which is at floor level. The basement floor level varies from 10 to 19 ft below the first floor, depending on the process tank/chamber size (LASL 1968, 081175.19; LASL 1968, 081175.28; LASL 1968, 081175.29). The bottoms and sidewalls of each of these areas are constructed of approximately 1-ft-thick concrete (LASL 1968, 081175.19). A floor drain is located in this area immediately south of the pressure filter system.

North of Area 105 was the raw waste storage area (Figure 2.1-1). This area includes an access area to the west; the bar screen, grit chamber, weir, sump, pH-control assembly, flow meter, and the sampler to the southwest; and the two side-by-side 29,000-gal. concrete raw influent waste storage tanks (LASL 1968, 081175.53; Christenson and Emelity 1970, 008428). The concrete raw waste storage area tanks are 17 ft deep along the inner walls and 19 ft, 4 in. from the top to the bottom of the walls along the exterior, and each is approximately 14 ft below ground surface (bgs) (LASL 1968, 081175.19; LASL 1968, 081175.28). The bottoms and sidewalls of each tank are approximately 1-ft-thick concrete (LASL 1968, 081175.19). A floor drain is located along the south wall of the westernmost tank area (Figure 2.1-1).

Area 106 was the batch waste treatment area (Figure 2.1-1). In addition to the batch waste treatment tanks and lines, this area included laboratory-type facilities (counters, cabinets, and sinks); a desk area; and the main process control panel. Two floor drains are located in this area: one near the center and one to the north at the interface to the sludge storage tank area.

Area 107 was the maintenance area that was used for minor equipment maintenance and repair (Figure 2.1-1) (LASL 1968, 081175.14). A floor drain is located along the south wall approximately east of the middle of this wall span.

Room 108 was used as a laboratory where samples of the treated waste effluent were analyzed (Figure 2.1-1) (LASL 1968, 081175.14; LASL 1968, 081175.25). A floor drain is located at the center.

Room 109 was the electrical and mechanical utility room (Figure 2.1-1) (LASL 1968, 081175.14). A floor drain is located near the center.

Room 111 was the personnel change room with a restroom and lockers (Figure 2.1-1) (LASL 1968, 081175.14). A floor drain is located along the south wall near the west entry door.

Room 112 was a custodial closet (Figure 2.1-1).

Room 113 was the chemical storage room (Figure 2.1-1) (LASL 1968, 081175.14). A floor drain is located near the center.

Building Floor Drainlines

As described above, numerous floor drains are located throughout the facility (Figure 2.1-1). These drains tied into the TA-21 main sewer line and the raw waste storage area, or they discharged north of the building into DP Canyon. Specifically, floor drains located in the pug mill, americium drum tumbler,

chemical feeder, and batch waste tank areas tied into a drain that appears to empty into the raw storage area. Floor drains located in the electrical/mechanical area, laboratory, pressure filter, and maintenance areas appear to run south to a manhole that is part of the TA-21 sewage system and also connect to the line that enters into the raw waste storage tank area.

All exterior drainlines are addressed in the approved Delayed Sites work plan (LANL 2009, 108166.9, section 8.0; NMED 2010, 108443), with the exception of the floor drainline that exits the northeast side of the building (Figure 2.1-1). It discharges to a culvert under the road that then discharged down the side of the canyon, just east of outfall SWMU 21-011(k). This drainline has not been described in any other document. It connects the floor drains in the batch waste treatment area, chemical storage area, and change room.

Exterior Tanks

Six aboveground tanks were located along the west side of building 21-257, four of which are still present (Figures 2.0-1 and 2.1-1). Each of these tanks is designated a SWMU and investigation of the tanks is addressed in the Delayed Sites work plan (LANL 2009, 108166.9, section 8.0; NMED 2010, 108443). These tanks are discussed in this work plan as part of the waste treatment process at building 21-257.

The cement silo tank (structure 21-191) and acid storage tank (structure 21-256) were used in the pug mill operations. The 50% sodium hydroxide solution storage tank (structure 21-288) and americium raffinate storage tank (structure 21-289) were used in the batch waste storage treatment process. Tanks 21-110 and 21-111 were used for DP East influent waste storage (LASL 1968, 081175.26). About 50 ft northwest of building 21-257 are the two effluent waste holding tanks: structures 21-112 and 21-113 (LASL 1968, 081175.27).

2.1.2 Waste Streams and Treatment Processes

Radioactivity levels and types of waste solutions treated at building 21-257 necessitated the use of a variety of waste management methods. The plant was designed to treat wastes at about 475 L/min (Emelity and Christenson 1971, 082623). The main waste stream, largely cleanup and decontamination solutions from DP West, was delivered to the treatment plant via a separate sewer line. The plutonium activity level was usually less than 1×10^{-3} µCi/mL with the plutonium-239 isotope representing about 80% of the total (Emelity and Christenson 1971, 082623). Approximate average annual volumes of plutonium-contaminated liquid wastes processed during the years from 1966 to 1970 included 11,849,200 L of main stream waste, 76,062 L of americium-plutonium waste, 342 L of alcohol waste, and 146 L of oil (Emelity and Christenson 1971, 082623). Summaries of the waste types and treatment process are provided below. More details of the waste treatment process can be found in a journal article entitled, “Chemical Treatment and Cement Fixation of Radioactive Wastes” by C.W. Christenson and L.A. Emelity (1970, 008428).

By 1985, all uranium processing at TA-21 had stopped, and after clean-up and processing of the sludge backlog, operations of the building 21-257 plant were reduced (LANL 1985, 008404). Beginning in the mid-1980s, the treated wastes were pumped through a line connected to storage tanks at TA-50 (Emelity 1987, 001777).

2.1.2.1 Main “Continuous Stream” Waste

The main “continuous stream” waste transferred to building 21-257 came from DP West (buildings 21-002, 21-003, 21-004, 21-005, and 21-150) through a 4-in. acid waste line and from DP East

(buildings 21-152 and 21-155) through a 3-in. acid waste line (LASL 1968, 081175.24; Christenson and Emelity 1970, 008428; LANL 2009, 108166.9; NMED 2010, 108443). DP West wastes were initially stored in the raw waste storage tanks north of Area 105. A schematic diagram of this liquid waste treatment process is shown in Figure 2.1-2.

The main waste from DP East was stored in waste storage tanks (structures 21-110 and 21-111, Figure 2.1-1) (LASL 1968, 081175.26; LASL 1968, 081175.24) and then fed at a controlled rate into the bar screen and grit chamber entry to the raw waste treatment process (Figures 2.1-1 and 2.1-2) (LASL 1968, 081175.24; Christenson and Emelity 1970, 008428). Overflow waste from these storage tanks could be released to the seepage beds at MDA T or DP Canyon.

2.1.2.2 Other "Batch-Type" Wastes

In addition to the main continuous waste stream described above, a variety of other wastes classified as "batch-type" arrived at the plant (Christenson and Emelity 1970, 008428). Some of these wastes included raffinate waste (liquid remaining after extraction) or citrate waste from DP West (Christenson and Emelity 1970, 008428; LANL 2009, 108166.9; NMED 2010, 108443). Other "batch-type" wastes were delivered in 270-gal. (1000-L) stainless-steel tank trailers (Christenson and Emelity 1970, 008428; Emelity and Christenson 1971, 082623). Assorted wastes in 100-mL to 9-L polyethylene or glass bottles that were enclosed in stainless-steel cans were often received for treatment (Christenson and Emelity 1970, 008428). The wastes usually contained a much higher level of plutonium activity than the wastes received through the industrial waste lines and included solutions of a chemical nature not compatible with the chemical treatment methods employed for the main waste stream (e.g., alcohol and vacuum pump oil) (Emelity and Christenson 1971, 082623).

Raffinate or Citrate Wastes

These wastes entered the plant from DP West through the 1.5-in. stainless-steel lines and were stored in three special stainless-steel or concrete batch waste storage tanks (Figure 2.1-1) (Christenson and Emelity 1970, 008428; LANL 2009, 108166.9; NMED 2010, 108443). These wastes were treated in Areas 104 and 106 where the chemical feeders and batch waste treatment process equipment were located. Treated waste was routed to either the sludge storage tank (Area 105, Figure 2.1-1) or to the acid storage tank (structure 21-256, Figure 2.1-1) for further processing.

High-Solids-Content, Highly Acidic Americium-Plutonium Wastes

High-solids-content, highly acidic americium-plutonium waste solutions containing americium-241 and plutonium-239 were received in 1000-L tank trailer lots (Christenson and Emelity 1970, 008428; Emelity and Christenson 1971, 082623). Until the pug mill system was installed at the new plant, these highly acidic wastes were neutralized with sodium hydroxide; 75-L amounts of the neutralized solution were transferred by vacuum to 200-L steel drums containing cement and vermiculite (Figure 2.1-2). The drums were tumbled, permitted to set, and sent for burial (Emelity and Christenson 1971, 082623).

The pug mill system, also referred to as the cement-fixation process, was put into operation in May 1968 (Emelity and Christenson 1971, 082623). This process is shown schematically in Figure 2.1-3. The pug mill was a large, horizontal, rubber-lined mixer with a number of separate paddles that mixed and moved the contents from an inlet at one end to an outlet at the other (Christenson and Emelity 1970, 008428). The cement waste generated from this process was pumped into shafts at MDA T for disposal.

Other Wastes

Approximate total and average monthly volumes of other batch wastes (excluding the high-solids-content, highly acidic americium-plutonium wastes discussed previously) processed from January 1968 to June 1969 included the following (Christenson and Emelity 1970, 008428):

- Americium-Plutonium Solution: 1165-gal. total; 97-gal./mo average
- Potassium-Hydroxide (Fluoride) Solution: 2438-gal. total; 203-gal./mo average
- Distillate: 12,543-gal. total; 1045-gal./mo average
- Strip: 2695-gal. total; 225-gal./mo average
- Solids Cyanide-Asphalt: 1787 lb from January 1968 to June 1969; 357-lb/mo average during the months received
- Alcohol-Plutonium Solution: 65-gal. total for 6 mo only; 11-gal./mo average during months received
- Nitric Acid Solution: 32.4-gal. total for 5 mo only; 7-gal./mo average during the months received
- Oil: Only 1.6-gal. total received August 1968
- Lard-Vegetable Oil: 6.3-gal. total received in September 1968
- Uranium-235 Solution: 1062-gal. total (none in July 1968); 97-gal./mo average the during months received
- Miscellaneous: 31-gal. total for 6 mo only; 5-gal./mo average during the months received

2.1.3 AOCs

In the 1990 SWMU report (LANL 1990, 007512), AOC 21-001 is described as a storage area for sludge-filled drums. These drums were stored southwest of building 21-257 before they were transferred to TA-54. No releases were known to have occurred in this area, but it is possible they may have occurred; therefore, the area was designated as an AOC.

A leaking pipe was discovered at the northwest corner of building 21-257. Soil samples were collected and americium was detected. There is some discrepancy as to whether the area was cleaned up (Soholt 1987, 000436). This area appears to be AOC C-21-005, described as a release of americium-241 and plutonium-239 in the MDA T investigation report (LANL 2006, 094151).

AOC C-21-007 is described as a 1982 spill from a tank vent that released americium, plutonium, and uranium to the surrounding area near building 21-257 (Emelity 1982, 007393). Approximately 50 to 100 L of waste liquid escaped, contaminating the building roof and surrounding area. The plant operator, unaware that a tank had been filled with acid waste, added carbonate sludge to the tank, causing a reaction. The building and area were cleaned and actions were taken to prevent a recurrence. No location map is available, and no documentation of which tank was involved is available. Additionally, no analytical data or documentation of the cleanup activity is available.

AOC C-21-033 was a cement paste spill that occurred when radioactive cement was being pumped from building 21-257 into corrugated metal piping to later become the absorption bed shafts. According to an office memorandum from January 1977 (Buchholz 1977, 001920), the spill area was cleaned up. Although the approved DP Delayed Sites work plan (LANL 2009, 108166.9; NMED 2010, 108443) states this AOC will be addressed in conjunction with the investigation of SWMU 21-011(a), building

21-257, this area is near the absorption beds and is not in close proximity to the building 21-257 investigation area. Therefore, this area has been addressed under the investigation of the absorption beds and is discussed in the MDA T investigation report (LANL 2006, 094151); AOC C-21-033 is not included in this work plan.

2.2 Previous Investigations

Subsurface sampling has not been completed to address the building 21-257 footprint. Some samples were previously collected around the building during the 2005–2006 MDA T investigation (Figure 2.2-1) (LANL 2006, 094151). Section 2.2.1 presents the nature and extent summary for data collected in the vicinity of building 21-257 (LANL 2006, 094151). Plates I-4.1-7 through I-4.1-9 of the MDA T investigation report present the analytical data (LANL 2006, 094151, Appendix I). Section 2.2.2 presents the results of a 1972 alpha survey performed in and around building 21-257.

2.2.1 Nature and Extent of Inorganics, Organics, and Radionuclides

Inorganic Chemicals

Eight inorganic chemicals of potential concern (COPCs) were identified within the building 21-257 sampling area: aluminum, arsenic, barium, cadmium, nitrate, perchlorate, selenium, and zinc.

Based on the 2005–2006 investigation data, the nature and extent of all inorganic COPCs have been defined for samples collected around building 21-257.

Organic Chemicals

The following organic chemicals were identified as COPCs: acenaphthene; acetone; anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzoic acid; bis(2-ethylhexyl)phthalate; chrysene; fluoranthene; fluorene; heptachlorodibenzodioxin(1,2,3,4,6,7,8-); heptachlorodibenzofuran(1,2,3,4,6,7,8-); hexachlorodibenzodioxin(1,2,3,4,7,8-); hexachlorodibenzodioxin (1,2,3,6,7,8-); hexachlorodibenzodioxin(1,2,3,7,8,9-); hexachlorodibenzofuran(2,3,4,6,7,8-); indeno(1,2,3-cd)pyrene; methylene chloride; methylnaphthalene(2-); naphthalene; octachlorodibenzodioxin(1,2,3,4,6,7,8,9-); octachlorodibenzofuran(1,2,3,4,6,7,8,9-); pentchlorodibenzofuran(2,3,4,7,8-); phenanthrene; and pyrene.

Based on the 2005–2006 investigation data, the nature and extent of all organic COPCs have been defined for samples collected around building 21-257.

Radionuclides

Seven radionuclide COPCs were identified within the building 21-257 sampling area, including americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, tritium, and uranium-235.

Based on the 2005–2006 investigation data, the nature and extent of all radionuclide COPCs have been defined for samples collected around building 21-257.

2.2.2 1972 Alpha Survey

An alpha survey of the inside and outside perimeter of building 21-257 was completed in the early 1970s (Stafford 1972, 000358). The results of this survey are shown in Figure 2.2-2. At that time, there

appeared to be widespread areas of radiological contamination, with the highest level detected in the area of the control panel. High levels of radiation were also detected inside the laboratory hood and in the area of the pug mill.

The survey results showed the highest levels of contamination detected outside the building were near the raw waste holding tanks, at the raffinate storage tanks, and at the north side of the building (Figure 2.2-2).

2.3 Scope of Activities for Building 21-257

The sampling proposed in this work plan will occur after the building footprint, including subsurface concrete tanks, associated floor drainlines, and areas of elevated radiological contamination, have been removed. The proposed sampling locations for the building 21-257 footprint are shown in Figure 2.3-1. Table 2.3-1 provides a summary of the proposed sampling objectives, number of samples, sampling locations and depths, and analytical suites.

During demolition of building 21-257, the location and condition of subsurface waste lines, drains, sumps, tanks, and other structures as well as areas that exhibit elevated field-screening results during the removal process will be documented. As prescribed in section 8.7 of the approved Delayed Sites work plan (LANL 2009, 108166.9; NMED 2010, 108443), alpha, beta, and gamma radiological field surveys will be performed after the structures are removed and the results will be used to guide investigation/remediation. The locations proposed in this plan will be sampled after any necessary remediation is completed. Final remediation area dimensions will be recorded and used to determine the confirmation sampling locations and depths.

Any floor drainline that was not removed during demolition activities or that is encountered during investigation activities will be removed under this work plan. During floor drainline removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated field-screening results have been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment.

The investigation methods outlined in section 8 of the approved Delayed Sites work plan will be implemented to perform this work (LANL 2009, 108166.9; NMED 2010, 108443). A list of the standard operating procedures (SOPs) used to guide the fieldwork and sampling is available at http://www.lanl.gov/community-environment/environmental-stewardship/plans-procedures.php. The SOPs are also available in the electronic public reading room at http://eprr.lanl.gov/oppie/service. As discussed in Appendix B of the approved Delayed Sites work plan (LANL 2009, 108166.9; NMED 2010, 108443), all investigation-derived waste generated will be managed in accordance with the current version of EP DIR-SOP-10021, Characterization and Management of Environmental Program Waste.

All samples will be analyzed for target analyte list (TAL) metals; cyanide; nitrate; perchlorates; volatile organic chemicals (VOCs); semivolatile organic chemicals (SVOCs); radionuclides (americium-241, isotopic plutonium, isotopic thorium [to detect actinium-227], isotopic uranium, strontium-90, technetium-99, and tritium and by gamma spectroscopy); moisture; and pH. In addition, at least 20% of all samples will be analyzed for an extended suite consisting of dioxins/furans, explosives compounds, and polychlorinated biphenyls (PCBs) as directed in the approved Delayed Sites work plan (LANL 2009, 108166.9; NMED 2010, 108443). The locations selected for extended-suite analysis are areas where contaminants had the most potential to be released to the environment (e.g., floor drains, tanks; Table 2.3-1). Where field-screening results identify locations with higher readings than locations already selected for extended-suite analyses (locations 1, 2, 5, 6, 7, 14, 16, 17, 29, 35, 41, 43, and 46–52), they will also be sampled and analyzed for the extended suite.

The data will be reviewed for each site once they are received from the analytical laboratory to determine whether extent is defined and if risk/dose is acceptable. If it is concluded that extent is not defined and/or risk/dose is unacceptable, additional sampling and/or remediation of the site will be implemented until the investigation is complete. Activities resulting from the data review may include, but are not limited to, collecting step-out samples, collecting deeper samples, and performing soil removal activities.

The investigation of the building 21-257 footprint and associated AOCs will consist of the following activities (Table 2.3-1).

- *Under the areas/rooms in building 21-257*. Samples will be collected from under areas/rooms (Figure 2.3-1, locations 1–15) at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft below the excavated floor. The raw waste storage area, batch storage tank area, batch waste storage overflow area, flocculator, sludge collector, settling tanks, and sludge storage areas were below the floor surface, ranging in depths from approximately 5–15 ft below the floor surface. Locations 1, 2, 5, 6, 7, and 14 will also be analyzed for the extended suite and will include the raw waste storage area, some of the waste process area, and the stockroom area. Sampling locations may be adjusted and/or added based on field-screening results and visual inspection performed demolition activities. Zero depth is defined as immediately below the excavated tank floor/process area floor/foundation.
- *Under-the-floor drains, floor drain cleanouts, select floor drainline connections/bends, and DP East waste line*. Samples will be collected from under each floor drain, cleanout, one floor drainline connection, and under one floor drainline (Figure 2.3-1, locations 16–37), at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft below the floor drains/cleanouts/line connection. Locations 16, 17, 29, and 35 will also be analyzed for the extended suite because these floor drains were located near the batch waste storage area, chemical storage room, and the electrical/mechanical room. Sampling locations may be adjusted and/or added based on field-screening results and visual inspection performed during demolition activities. Zero depth is defined as immediately below the excavated floor drain/floor drainline/cleanout/DP East waste line.
- *Within the AOCs adjacent to the building.* Samples will be collected from under each AOC (Figure 2.3-2, locations 38–46). At locations 38 through 41, samples will be collected at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft below the excavated waste lines. For these sampling locations, zero depth is defined as immediately below the excavated waste lines. At locations 42 through 46, samples will be collected at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs. At these sampling locations, zero depth is defined as the ground surface. Sampling locations may be adjusted and/or added based on field-screening results and visual inspection performed during demolition activities. Locations 41, 43, and 46 will also be analyzed for the extended suite.
- *At the floor drain outfall area.* Samples will be collected from the center of the outlet of the former outfall area (Figure 2.3-3, location 47) at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs. Two locations (48 and 49) will be sampled 5 ft east and 5 ft west of location 47 at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs. Another set of samples will be collected 10 ft downslope of the outfall (locations 50 through 52) at 0.0–1.0 ft, 2.0–3.0 ft, and 4.0–5.0 ft bgs. Drainage flows to the north and east to an existing culvert. Zero depth is defined as the ground surface. All samples collected from the outfall area (locations 47 through 52) will also be analyzed for an extended suite because this area may have received unspecified liquids from the batch waste treatment, chemical storage, and change room floor drains.
- *Additional locations addressing radiological survey data*. Additional samples may need to be collected from the building footprint, other than those already prescribed in the work plan. Sampling locations may be adjusted and/or added based on field-screening results and visual

inspection performed during demolition activities. This information will be documented in the investigation report.

3.0 SCHEDULE

The timeline for executing this work plan depends upon the demolition of building 21-257, which is planned for FY2020. An investigation report will be submitted within 6 mo of completing field activities.

4.0 REFERENCES AND MAP DATA SOURCES

4.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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4.2 Map Data Sources

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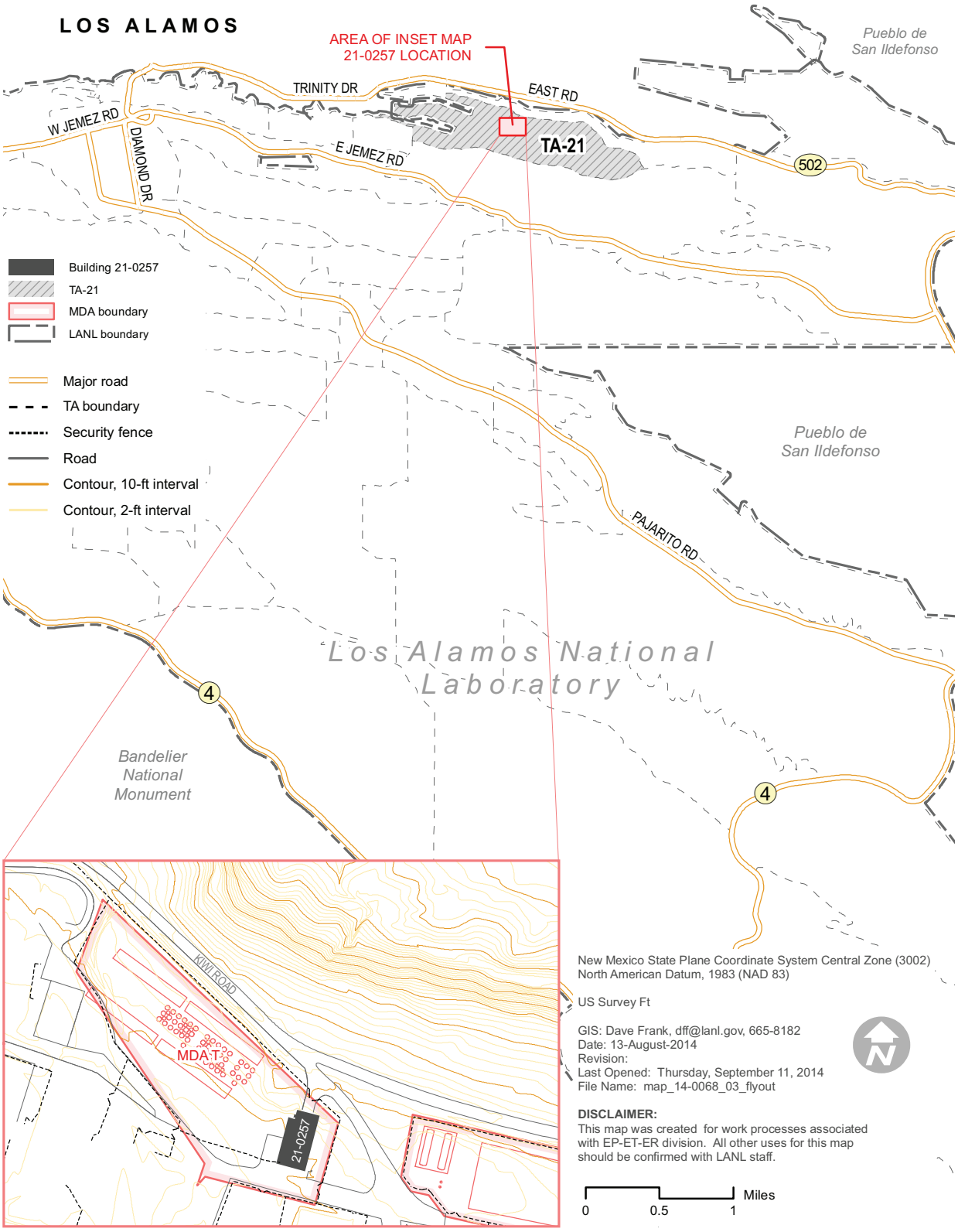


Figure 1.0-1 Location of building 21-257 at TA-21

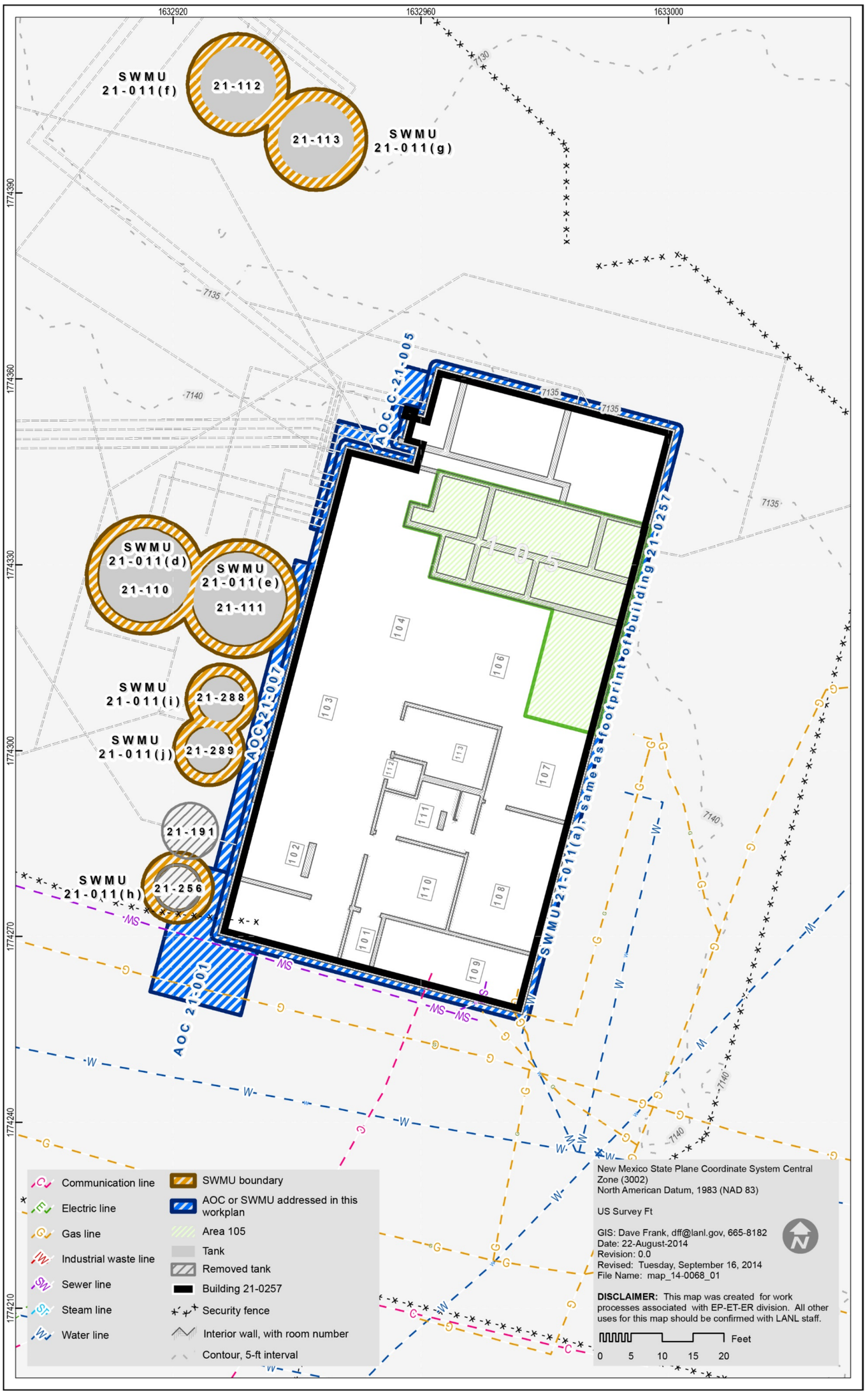


Figure 2.0-1 Building 21-257 AOCs, SWMUs, room/area numbers, and site utilities

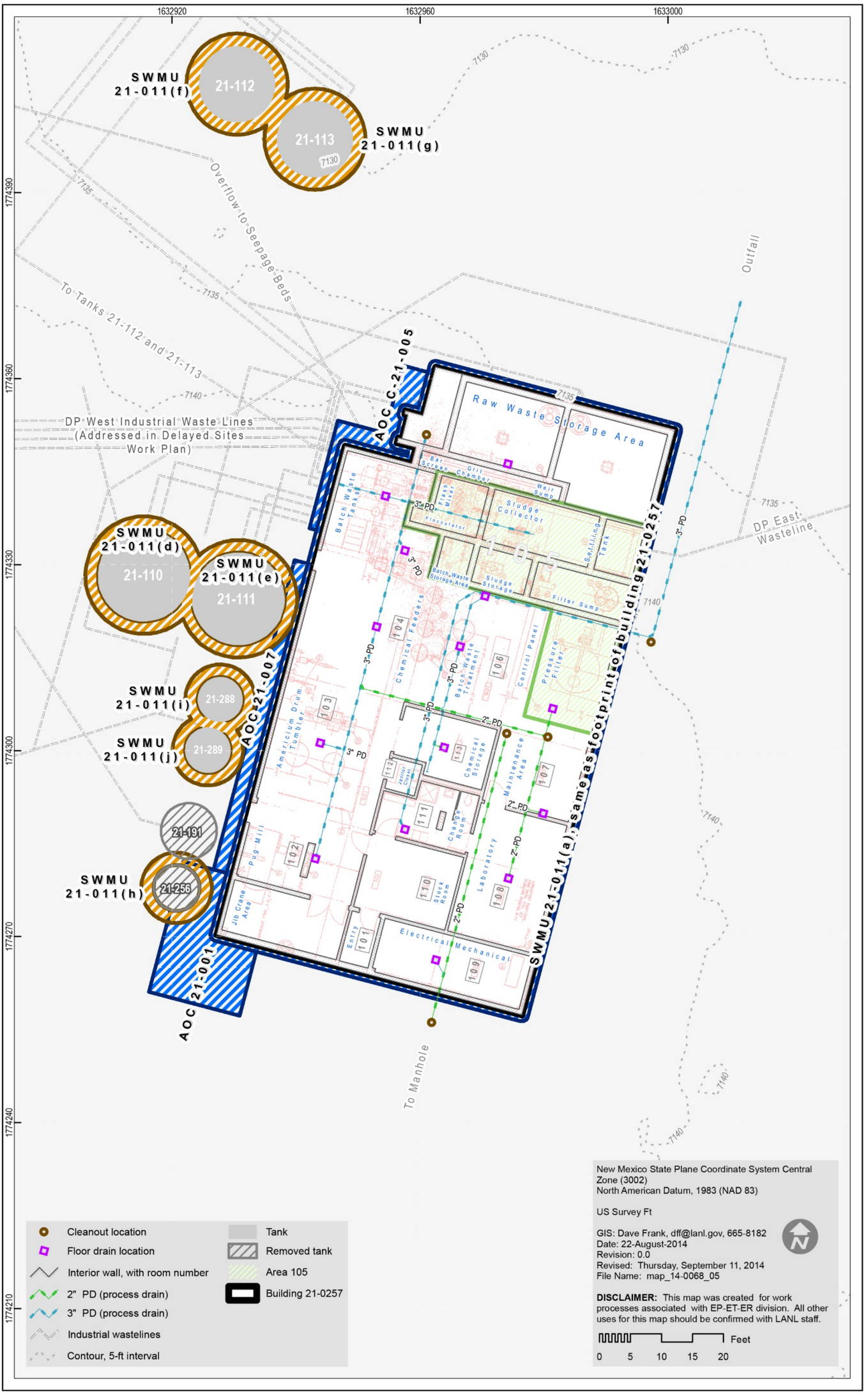
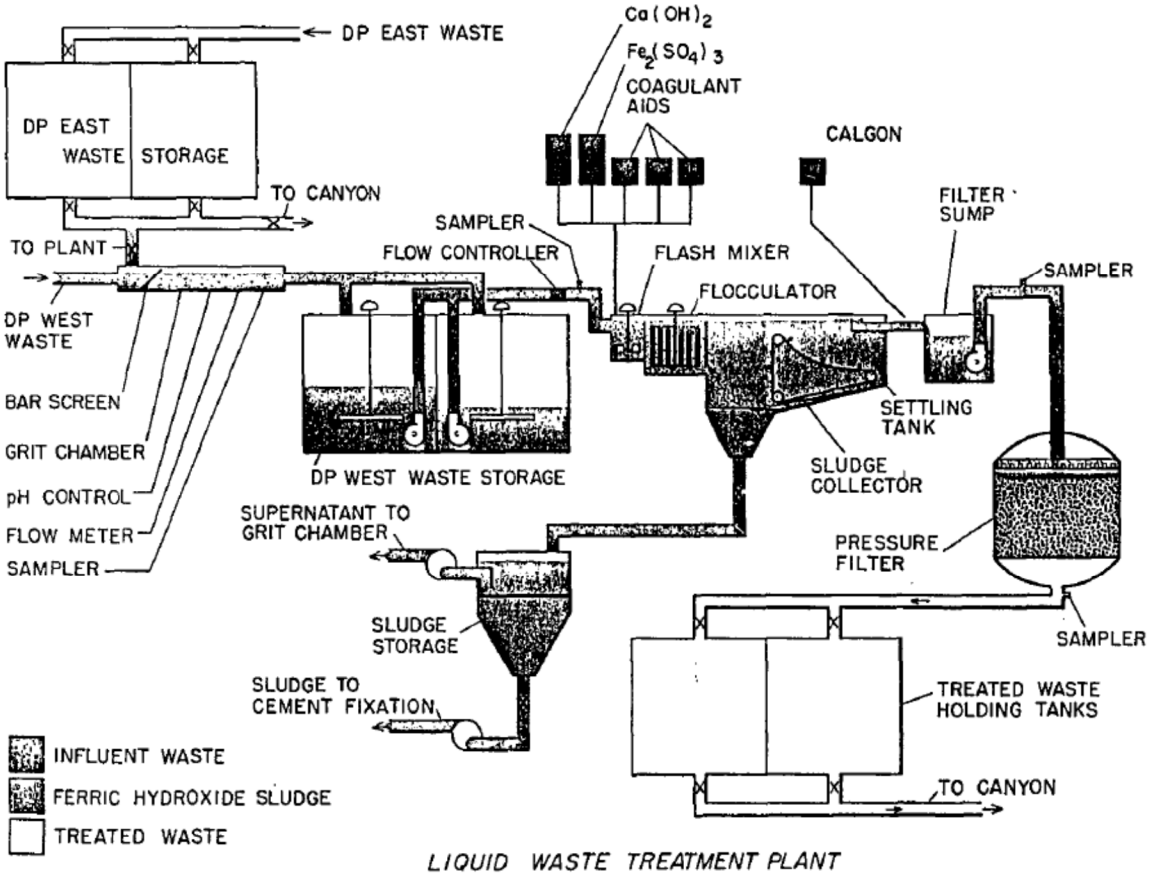
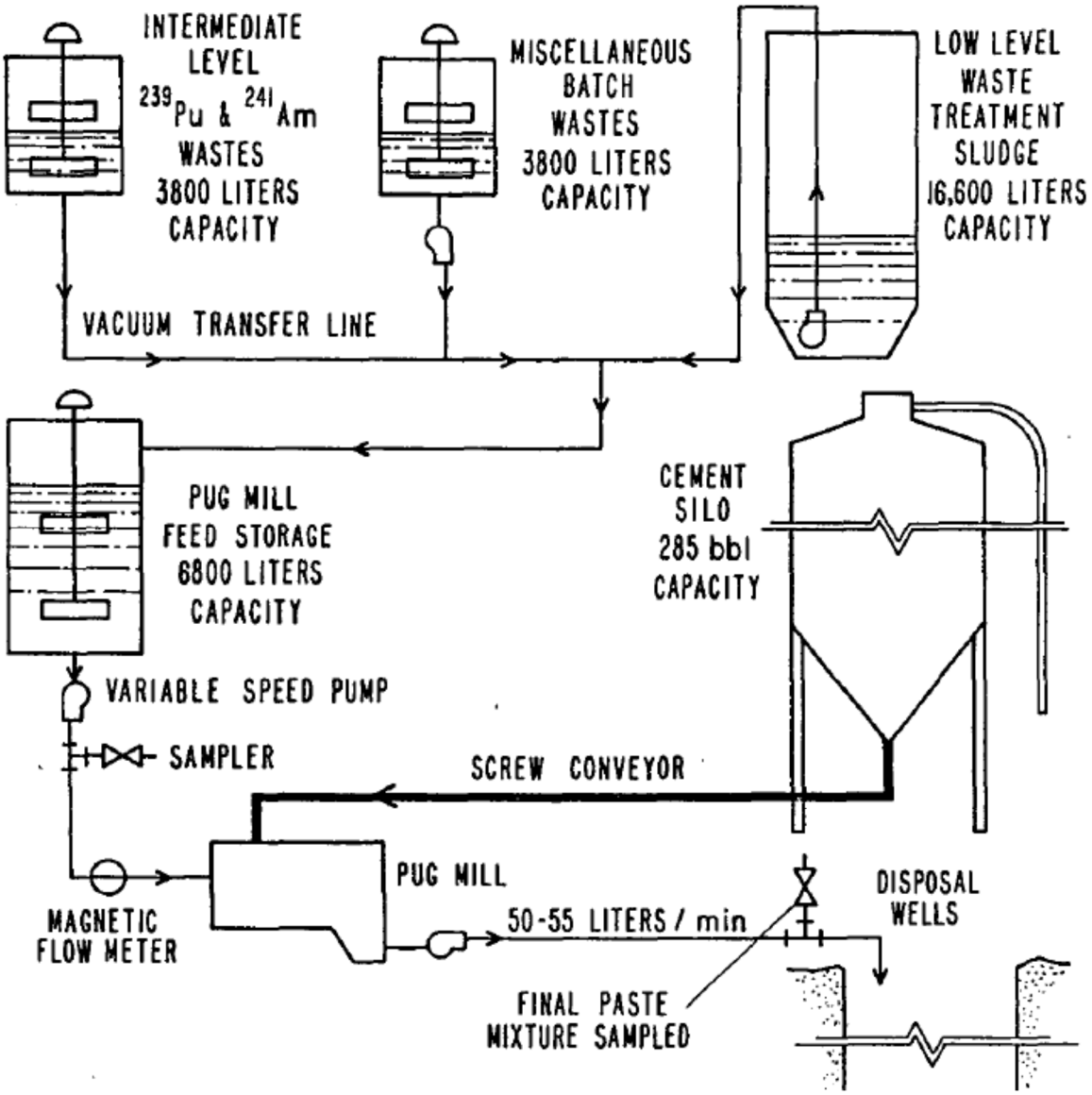


Figure 2.1-1 Building 21-257 process areas and floor drainlines



Source: Emelity and Christenson 1971, 082623.

Figure 2.1-2 Building 21-257 waste treatment process



Source: Emelity and Christenson 1971, 082623.

Figure 2.1-3 Building 21-257 pug mill system

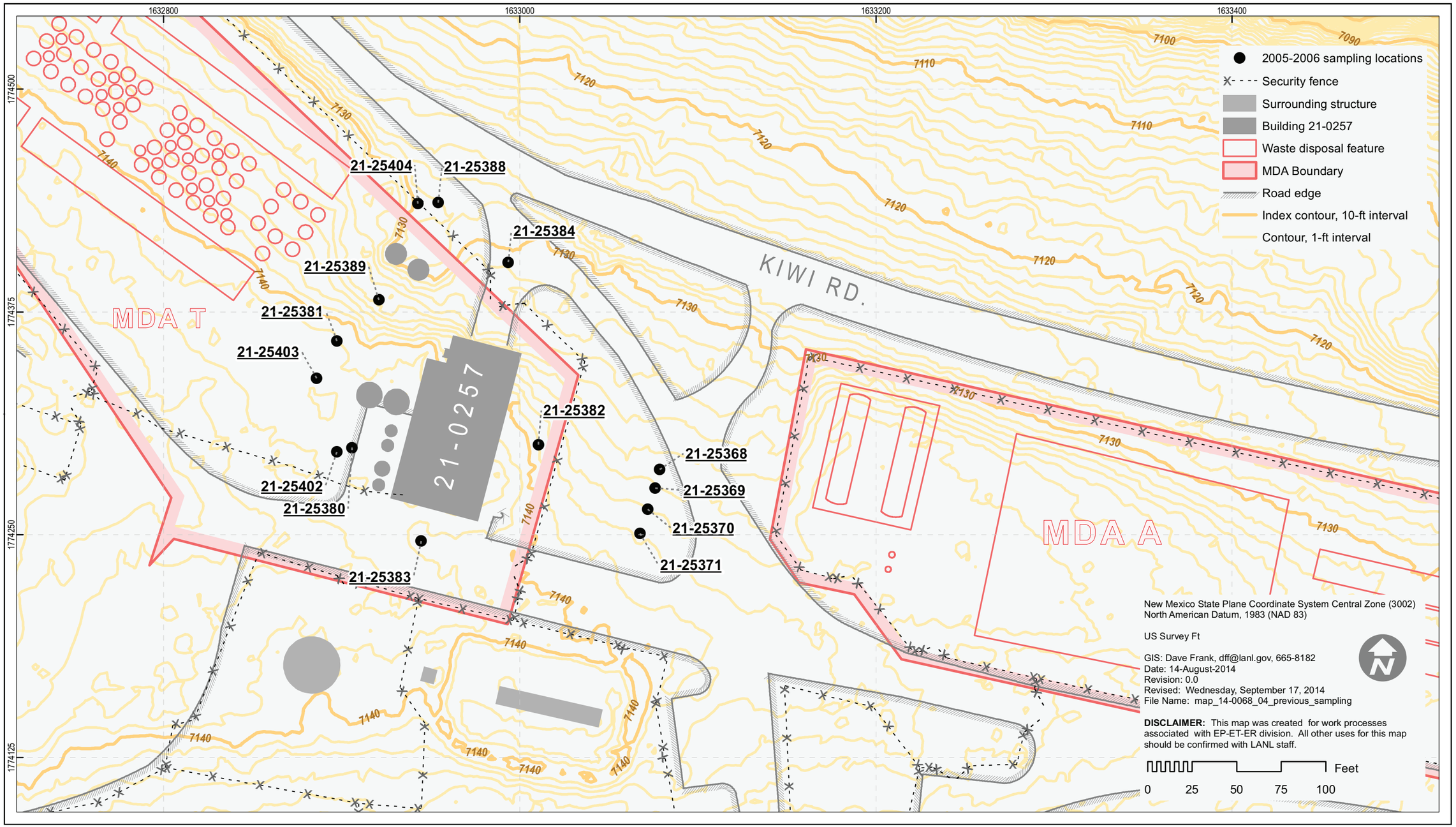
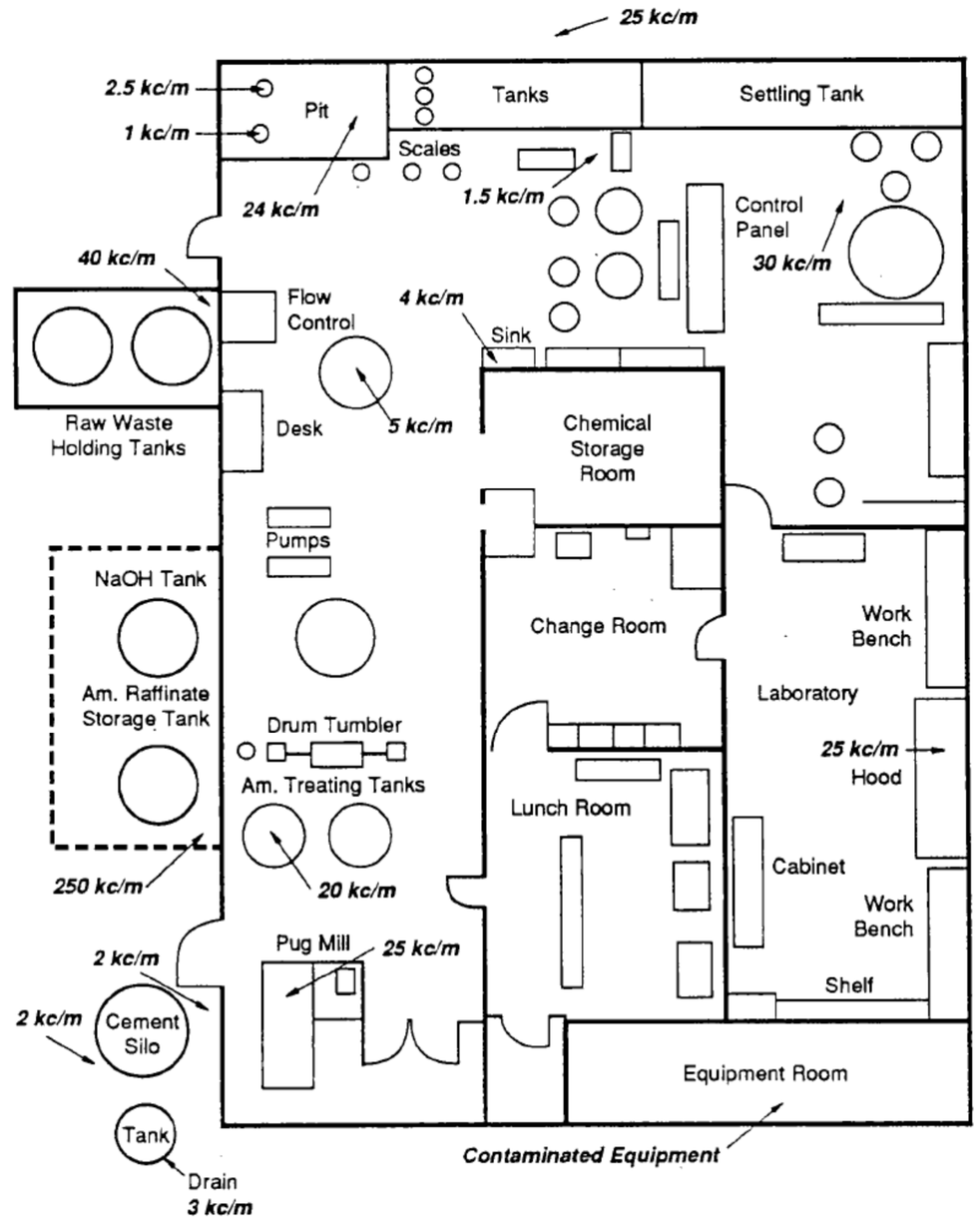


Figure 2.2-1 Sampling locations from 2005–2006 near building 21-257



Source: LANL 1991, 007529, Figure 16.5-3.
Note: kc/m = Thousand counts per minute.

Figure 2.2-2 Building 21-257 1972 alpha survey results



Figure 2.3-1 Proposed sampling locations within and around building 21-257 SWMU 21-011(a)

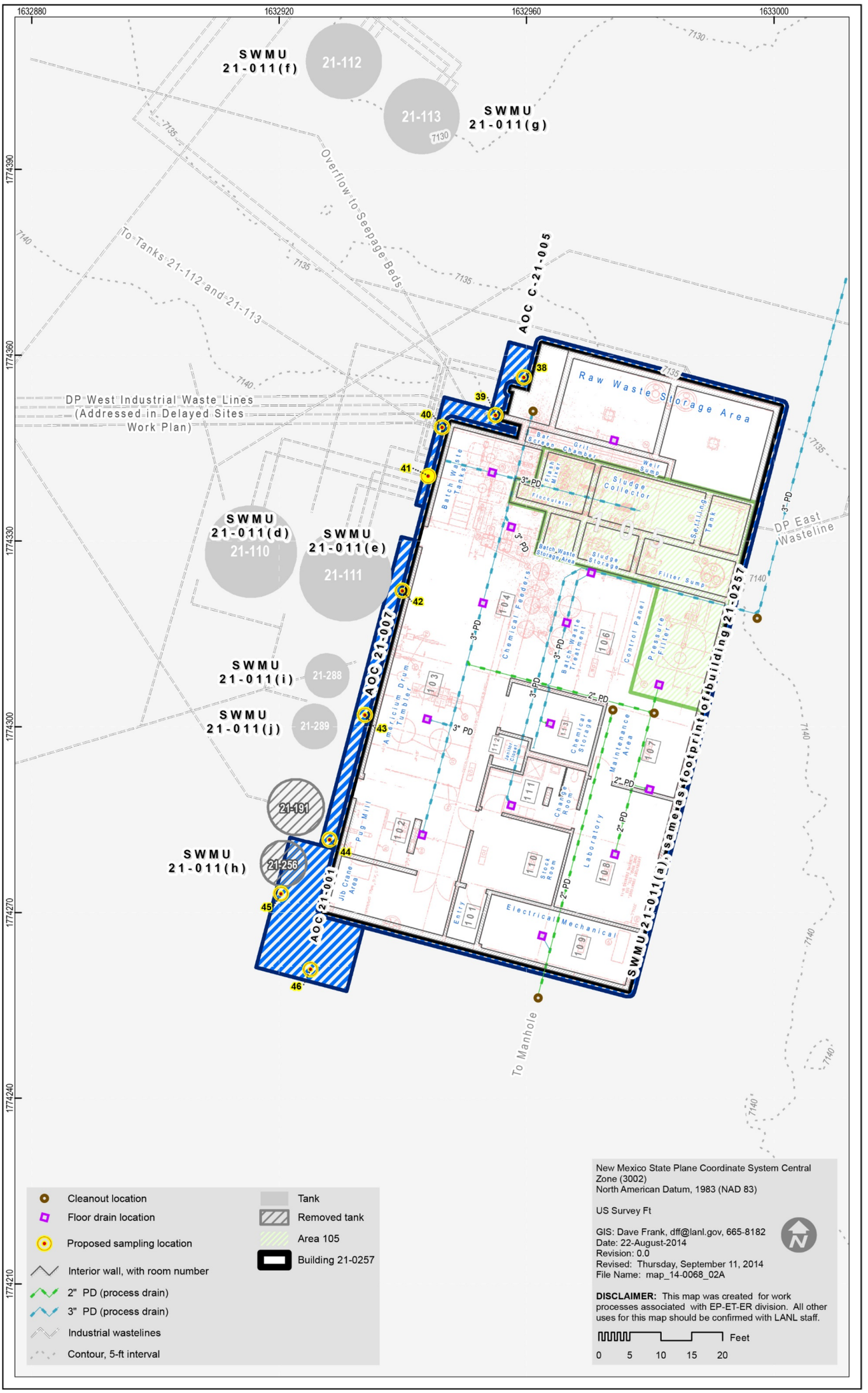


Figure 2.3-2 Proposed sampling locations outside building 21-257 at AOCs 21-001, C-21-005, and C-21-007

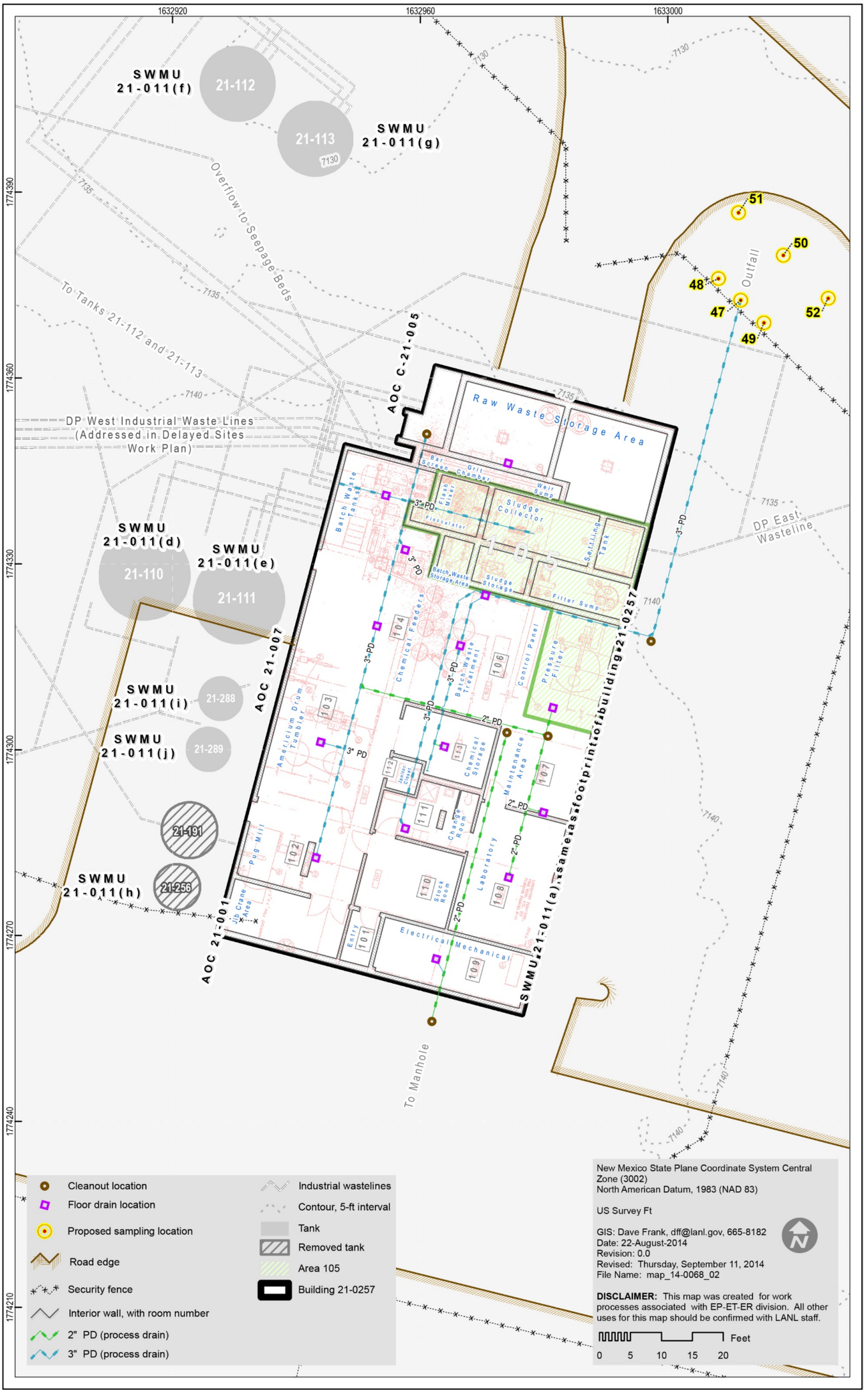


Figure 2.3-3 Proposed sampling locations at outfall area

Table 2.3-1
Proposed Sampling for Building 21-257 Footprint and Associated AOCs

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
SWMU 21-011(a)																			
Vertical extent of contamination under raw waste storage area tanks	1	Under raw waste storage area tank	0.0–1.0 2.0–3.0 4.0–5.0	X[b] X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under raw waste storage area tanks	2	Under raw waste storage area tank	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under flocculator	3	Under flocculator	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	—[c] — —
Vertical extent of contamination under sludge collector	4	Under sludge collector	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under settling tank	5	Under settling tank	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under batch waste storage area	6	Under batch waste storage area	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination under sludge storage area	7	Under sludge storage tank	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under filter sump	8	Under filter sump	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under batch storage tanks	9	South of batch storage tank area	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under chemical feeders	10	Under chemical feeders	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under pressure filter	11	Under pressure filter	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under drum tumbling equipment	12	Under drum tumbling equipment	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under pug mill, Room 102	13	Under pug mill, Room 102	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination under stockroom, Room 110	14	Under stockroom	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under southwest room	15	Under former jib crane area	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under cleanout	16	Under cleanout	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under floor drain	17	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under floor drain	18	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	19	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under cleanout	20	Under cleanout	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination under floor drain	21	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	22	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	23	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	24	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drainline	25	Under floor drain connection	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under cleanout	26	Under cleanout	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under cleanout	27	Under cleanout	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination under floor drain	28	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	29	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under floor drain	30	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	31	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	32	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drainline	33	Under floor drainline between locations 26 and 36	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under floor drain	34	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination under floor drain	35	Under floor drain	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination under cleanout	36	Under cleanout	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under waste line	37	Under waste line	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
AOC C-21-005																			
Vertical extent of contamination under waste lines	38	Under waste lines	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under waste lines	39	Under waste lines	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under waste lines	40	Under waste lines	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination under waste lines	41	Under waste lines	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
AOC C-21-007																			
Vertical extent of contamination from possible tank vent overflow next to the building	42	Next to tank 21-111	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Vertical extent of contamination from possible tank vent overflow next to the building	43	Next to tanks 21-288 and 21-289	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical extent of contamination from possible tank vent overflow next to the building	44	Next to former tanks 21-191 and 21-256	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
AOC 21-001																			
Vertical extent of contamination from possible leaking sludge tank stored near the southwest corner of the building	45	Five feet west of the southwest corner of building 21-257	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Vertical extent of contamination from possible leaking sludge tanks stored near the southwest corner of the building	46	Five feet south of the southwest corner of building 21-257	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Outfall Area																			
Vertical extent of contamination at the floor drains outfall	47	At the outfall	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical and horizontal extent of contamination at the floor drains outfall	48	Five feet west of the outfall and location 47	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Vertical and horizontal extent of contamination at the floor drains outfall	49	Five feet east of the outfall and location 47	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Lateral extent downgradient from outfall	50	Ten feet north of the outfall; near culvert	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Lateral extent downgradient from outfall	51	Ten feet west of location 50	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	TAL Metals (EPA SW-846: 6010B/6020) and Mercury (EPA SW-846:7471A)	Cyanide (EPA SW-846: 9012A)	Nitrate (EPA Method 300)	Perchlorates (EPA SW-846:6850)	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Isotopic Plutonium (HASL-300)	Isotopic Thorium (HASL-300: ISOTH)	Isotopic Uranium (HASL-300)	Strontium-90 (EPA Method 905.0)	Technetium-99 (HASL-300: Tc-99)	Tritium (EPA Method 906)	pH (EPA SW-846: 9045)	Dioxins, Furans, Explosive Compounds, PCBs[a] (EPA SW-846:8290; SW-846:8321A-MOD; SW-846:8082)
Lateral extent downgradient from outfall	52	Ten feet east of location 50	0.0–1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			2.0–3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			4.0–5.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosive compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended-suite analyses, these locations will also be sampled and analyzed for an extended suite.

[b] X = Analyzed for.

[c] — = Not analyzed for.